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CALVERT CLIFFS NUCLEAR POWER PLANT

July 3, 2013

U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 2; Docket No. 50-318; License No. DPR 69
Licensee Event Report 2013-003, Revision 00
Reactor Trip Due to Intermittent Failure in the Turbine Control System

The attached report is being sent to you as required by 10 CFR 50.73.

This letter contains no regulatory commitments.

Should you have questions regarding this report, please contact Mr. Douglas E. Lauver at (410) 495-5219.

Very truly yours,

A handwritten signature in black ink, appearing to read "Mark D. Flaherty".

Mark D. Flaherty
Plant General Manager

MDF/CAN/bjd

Attachment: As stated

cc: N. S. Morgan, NRC
W. M. Dean, NRC

Resident Inspector, NRC
S. Gray, DNR

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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4. TITLE
Reactor Trip Due to Intermittent Failure in the Turbine Control System

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR		DOCKET NUMBER
05	08	2013	2013	- 003 -	00	07	03	2013		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)									
10. POWER LEVEL 100	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(vii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)						
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER						
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME C. A. Neyman, Senior Engineering Analyst	TELEPHONE NUMBER (Include Area Code) 410-495-3507
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	TG	SC	W120	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 8, 2013, at 2147 eastern daylight time, Unit 2 experienced an automatic reactor trip from 99.5 percent power. The Reactor Protective System actuated on high pressurizer pressure. The high pressurizer pressure condition occurred due to a loss of load event caused when main turbine steam admission valves closed. The most probable cause of the event was an intermittent failure of a component or signal path in main turbine control cabinet 2T11 that resulted in a control signal to the steam admission valves to close. At Calvert Cliffs, there have been no recent similar events involving a reactor trip caused by the failure of the turbine control system. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A) due to Reactor Protective System actuation. Corrective actions include replacement of circuit cards in the main turbine overspeed protection circuitry, monitoring selected control system signals which could indicate the source of the signal should the event recur, and implementation of a project plan for selected turbine control circuit card replacement during a future refueling outage.

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I. DESCRIPTION OF EVENT:

A. PRE-EVENT PLANT CONDITIONS:

Unit 2 was operating at 99.5 percent of rated thermal power on May 8, 2013.

B. EVENT:

On May 8, 2013 at 2147 eastern daylight time, Calvert Cliffs Nuclear Power Plant Unit 2 experienced an automatic reactor trip from 99.5 percent power on a high pressurizer pressure signal from the Reactor Protective System. The high pressure condition was caused by a loss of load event and subsequent Reactor Coolant System heat-up when some or all of the main turbine governor valves, intercept valves, and throttle valves closed.

As a result of the loss of load event, Reactor Coolant System pressure rose to approximately 2396 psia causing the two power-operated relief valves to open briefly as designed. All control element assemblies fully inserted as expected. Following the reactor trip, the main turbine automatically tripped. Containment atmosphere parameters were unaffected by the trip. Radiation levels were not affected by the trip.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

There were no inoperable structures, components, or systems at the time of the trip that contributed to the event.

D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

The reactor trip occurred on May 8, 2013, at 2147. Operators implemented Emergency Operating Procedure (EOP)-0, Post-trip Immediate Actions.

At 2159, exited EOP-0 and implemented EOP-1, Reactor Trip, for an uncomplicated trip. All safety functions were met.

At 2254, exited EOP-1 and implemented Operating Procedure-4, Plant Shutdown from Power Operation to Hot Standby.

Inspections were performed on the affected equipment, including troubleshooting, circuit checks, calibrations of turbine control circuitry, and replacement of selected circuit cards in the Overspeed Protection Control circuit. The reactor was taken critical on May 11, 2013, at 1158.

On May 12, 2013, at 0134, the unit was paralleled to the grid.

On May 13, 2013, at 0330, the unit was returned to 99.5 percent power.

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E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

No other systems or secondary functions were affected.

F. METHOD OF DISCOVERY:

The event was self-revealing.

G. MAJOR OPERATOR ACTION:

No mitigating operator actions were taken as a result of this event.

H. SAFETY SYSTEM RESPONSES:

The Reactor Protective System operated as required. There were no safety system functional failures.

II. CAUSE OF EVENT:

The Unit 2 reactor trip is documented in station condition report number CR-2013-004209.

Based on troubleshooting, the overspeed protection circuitry was initially identified as the most likely cause of the event. To verify, four circuit cards from the overspeed protection control circuitry were removed and sent for laboratory analysis and testing. Two of the cards were High Threshold Logic (HTL) Latch 1 boards and two were HTL Gate 2 boards. The laboratory analysis of the removed circuit cards found one failed logic gate, on the HTL Gate 2 boards. The root cause team reviewed the logic diagrams for the turbine control system and determined that the failed gate was not a factor in the creation of a false close signal to the control valves. Therefore, the root cause was not identified. However, the most probable cause of the event was determined to be, an intermittent failure of a component or signal path in main turbine control cabinet 2T11 resulted in a close signal to the governor valves only, governor and intercept valves, or throttle valves only, initiating the event.

III. ANALYSIS OF EVENT:

This event resulted in a valid actuation of the Reactor Protective System. The actuation was not part of a pre-planned sequence during testing or reactor operation. Therefore, this event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A). Immediate notification of this event (Event Number 49012) was made on May 9, 2013, at 0009 in accordance with 10 CFR 50.72(b)(2)(iv)(B) and 10 CFR 50.72(b)(3)(iv)(A).

The Nuclear Regulatory Commission Performance Indicator for Unplanned Scrams per 7,000 Critical Hours is projected to rise to approximately 0.9 and remain green. No other performance indicators were impacted.

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There were no actual nuclear safety consequences incurred from this event. The loss of load event is analyzed in Section 14.5 of the Calvert Cliffs' Updated Final Safety Analysis Report. The most limiting loss of load event is initiated at hot full power with no credit allowed for operation of the steam dump and bypass system and power-operated relief valves. In this event, those systems operated as designed. The event is bounded by the Section 14.5 safety analysis.

An estimated conditional core damage probability of 1.03E-06 and an estimated conditional large early release probability of 9.30E-08 were calculated for this event.

IV. CORRECTIVE ACTIONS:

A. ACTION TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

1. Four circuit cards of eight in the overspeed protection circuitry were replaced.
2. Installed test equipment in the main control cabinet and connected recording devices to monitor control system signals.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

1. Develop and implement a project plan to replace selected turbine control circuit cards and/or replace the main turbine control system based upon established bridging strategies.

V. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

No failed components were identified.

B. PREVIOUS LERS ON SIMILAR EVENTS:

At Calvert Cliffs, there have been no recent similar events involving a reactor trip caused by the failure of the turbine control system.

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- C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EII) COMPONENT
FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM
REFERRED TO IN THIS LER:

COMPONENT

Main turbine control cabinet 2T11

IEEE 803
FUNCTION ID
SC

IEEE 805
SYSTEM ID
TG

- D. SPECIAL COMMENTS:

None